Ordering number : ENA2026A

# LB1638MC

**Monolithic Digital IC**

## Low-Voltage, Low-Saturation
## Bidirectional Motor Driver

ON Semiconductor®

http://onsemi.com

### Overview

The LB1638MC are low-saturation bidirectional motor driver ICs for use in low-voltage applications. At an $I_O$ of 500mA, they have a low saturation output of $V_O(sat)$ = 0.75V. They are especially suited for use in compact motor of portable equipment.

### Features

- Low voltage operation (2.5V min.)
- Low saturation voltage (upper transistor + lower transistor residual voltage; at $I_O$ = 500mA, $V_O(sat)$ = 0.75V typ.)
- Low current drain at standby mode ($I_{CCO}$ = 0.1μA typ. or less)
- Separate logic power supply and motor power supply
- Brake function
- Built-in spark killer diodes

### Specifications

**Absolute Maximum Ratings** at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Maximum supply voltage | $V_{CC}$ max | | -0.3 to +10.5 | V |
| | $V_S$ max | | -0.3 to +10.5 | V |
| Output applied voltage | $V_{OUT}$ | | -0.3 to $V_{CC}$+ $V_{SF}$ | V |
| Input applied voltage | $V_{IN}$ | | -0.3 to +10.0 | V |
| Ground pin flow-out current | $I_{GND}$ | | 1.0 | A |
| Allowable power dissipation | Pd max | Mounted on a specified board | 820 | mW |
| Operating temperature | Topr | | -20 to +75 | °C |
| Storage temperature | Tstg | | -40 to +125 | °C |

* Specified board: 114.3mm × 76.1mm × 1.6mm, glass epoxy board.

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Allowable Operating Conditions** at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Supply voltage range | $V_{CC}$ | | 2.5 to 9.0 | V |
| | $V_S$ | | 2.2 to 9.0 | V |
| Input high-level voltage | $V_{IH}$ | | 2.0 to 9.0 | V |
| Input low-level | $V_{IL}$ | | -0.3 to +0.7 | V |

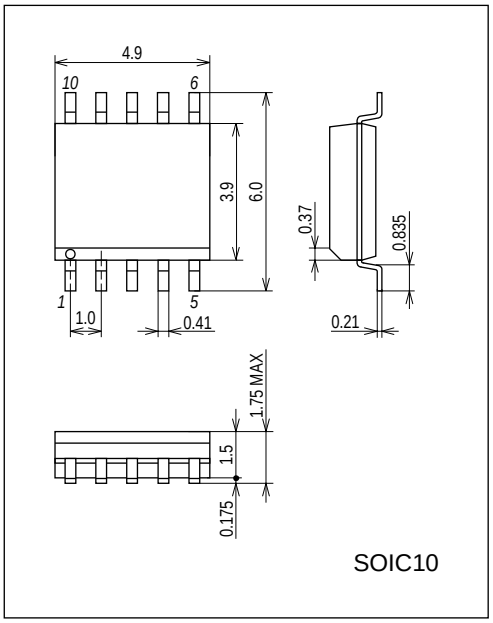
**Electrical Characteristics** at Ta = 25°C, $V_{CC}$ = 5V

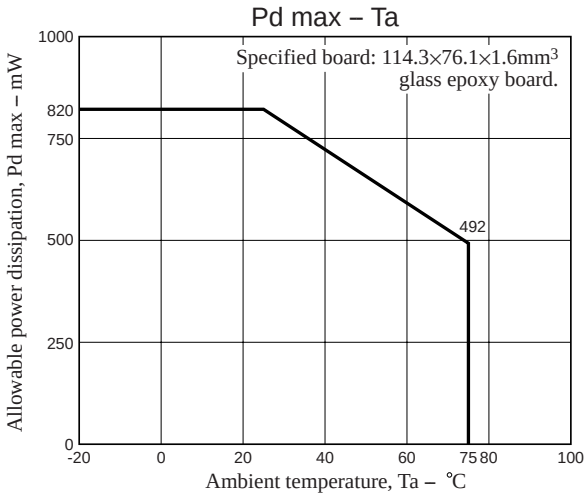
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Current drain | $I_{CC}0$ | $V_{IN}1,2$ $I_{CC} + I_S$ | | | 10 | μA |
| | $I_{CC}1$ | $V_{IN}1$ = 3V, $V_{IN}2$ = 0V $I_{CC} + I_S$ | | | 20 | mA |
| | $I_{CC}2$ | $V_{IN}1,2$ = 3V $I_{CC} + I_S$ | | | 40 | mA |
| Output saturation voltage (upper + lower) | $V_{OUT}1$ | $I_{OUT}$ = 200mA | | 0.25 | 0.5 | V |
| | $V_{OUT}2$ | $I_{OUT}$ = 500mA | | 0.70 | 1.3 | V |
| Output pin voltage difference | | $I_O$ = 200mA | | | 0.1 | V |
| Output sustain voltage | $V_O$(sus) | $I_{OUT}$ = 500mA | 9 | | | V |
| Input current | $I_{IN}$ | $V_{IN}$ = 7V, $V_{CC}$ = 7V | | | 0.5 | mA |
| **Spark killer diode** | | | | | | |
| Reverse current | $I_S$(leak) | $V_{CC}$, $V_S$ = 7V | | | 10 | μA |
| Forward voltage | $V_{SF}$ | $I_{OUT}$ = 200mA | | | 1.7 | V |

## Package Dimensions

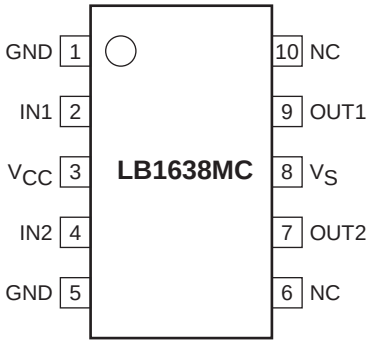
unit : mm (typ)

3426A



## Pin Assignment

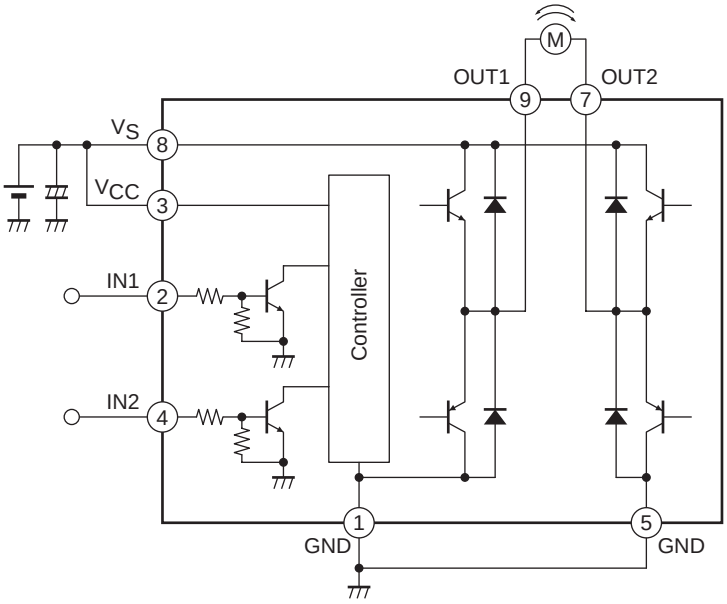



Note: both ground pins must be grounded.

## Truth Table

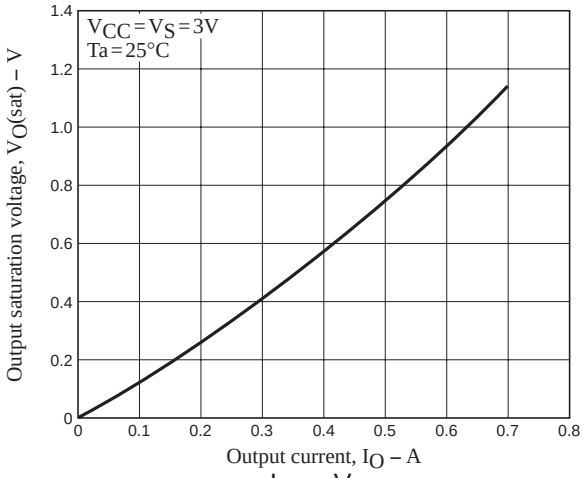
| IN1 | IN2 | OUT1 | OUT2 | MOde |
|---|---|---|---|---|
| H | L | H | L | Forward |
| L | H | L | H | Reverse |
| H | H | L | L | Brake |
| L | L | OFF | OFF | Standby |

## Block Diagram and Sample Application Circuit

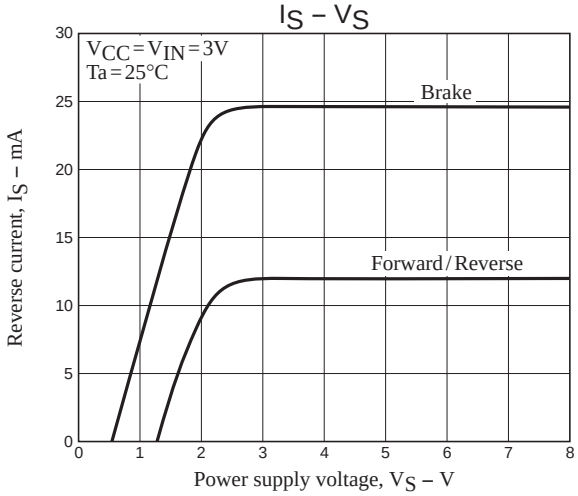



Note: When using the same power supply for $V_S$ and $V_{CC}$, short the $V_{CC}$ and $V_S$ pins to each other or insert a capacitor in the $V_{CC}$ line.

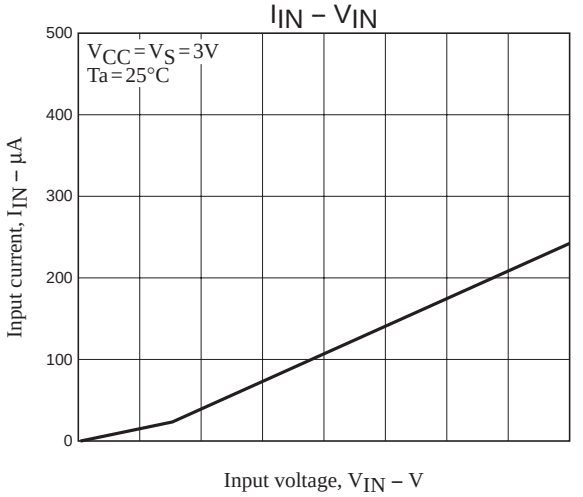
$V_O(sat) - I_O$



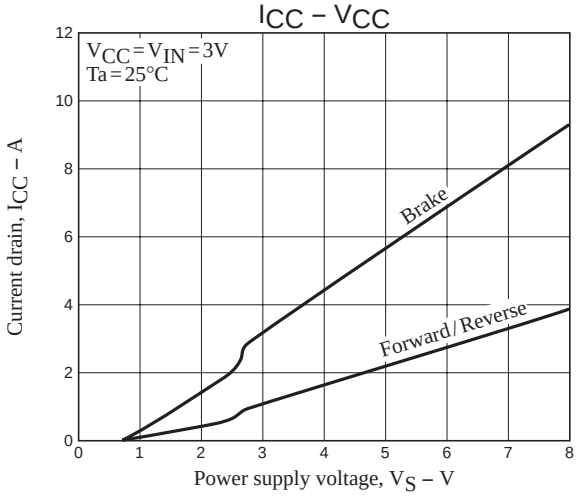

$I_S - V_S$




$I_{IN} - V_{IN}$




$I_{CC} - V_{CC}$

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